## REMARKS

Reconsideration of the present application is respectfully requested.

The present invention relates to a device for adjusting the position of a cutting insert that is adjustably secured in a pocket disposed in a holder, such as a tool body or a cartridge.

It is conventional to provide an adjusting device wherein the insert is adjusted by a wedge-shaped member which, when actuated by a screw, is caused to slide along a flank of the insert and thereby displace the insert. However, the sliding contact between the wedge and the insert produces an irregular sticking friction which results in an irregular movement of the wedge.

That problem is avoided by another conventional adjusting device in the form of a sleeve or pin having a slotted end which is expandable by a wedging screw, as shown in Fig. 7 (which depicts an adjusting device disclosed in the Basteck patent of record). The sleeve is force fitted into the tool body, and the screw engages an internal thread of the sleeve to draw a tapered head of the screw into the pin. One drawback of this device is that as the screw is advanced in the sleeve, rotational and linear forces are exerted on the sleeve which can eventually degrade the force fit. As the screw is advanced, the slotted end of the sleeve is expanded by the tapered head of the screw. The greatest expansion occurs at the top of the sleeve and progressively decreases along the length of the sleeve to the end of the slot, where expansion is essentially prevented by the solid nature of the sleeve. The asymmetrical expansion of the sleeve (greater at the top than at the bottom) results in a point contact occurring between the sleeve and the cutting insert, which can cause the insert to rotate in its pocket, rather than to slide linearly.

Also, if the portion of the slotted end of the sleeve situated diametrically opposite the point of contact between the sleeve and the cutting insert were to bear against a rigid wall of the tool body as it is expanded by the screw, the sleeve would tend to become bent as the screw is advanced, thereby progressively inhibiting insertion of the screw. If the wall of the holder were recessed from the slotted end of the sleeve to avoid the occurrence of such contact between the sleeve and such wall

during an adjustment step, then the slotted end of the sleeve would not be stabilized which could adversely affect the adjustment process.

An arrangement is known which eliminates the above-described shortcomings, but it is very costly. That arrangement is disclosed in the Mitchell et al. patent, of record, wherein the screw contacts a flexible part of the holder, e.g. a cantilevered rib, to flex the rib into contact with the cutting element. As described in the background section of the present application, it is time-consuming and expensive to manufacture a holder having a cantilevered rib. Also, if the rib becomes damaged or worn, requiring that it be reworked, the use of the entire tool body is lost.

Accordingly, it is an object of the invention to provide an insert-adjustment mechanism which achieves the following advantages in a relatively inexpensive manner and which does not require a loss of the tool body when the adjustment mechanism needs to be repaired or re-worked:

1. an absence of frictional sliding contact between the adjusting device and the cutting insert,

2. the absence of a need for force-fitting the adjusting device in place,

3. a linear displacement of the cutting insert absent rotation thereof during adjustment, and

4. a stabilization of the adjusting device during an insert-adjusting procedure.

The present invention achieves advantages 1 and 2 by providing an intermediate member (e.g., a sleeve 50) which is actuated by a wedging device (e.g., a conical part of a screw 70) that is attached to the holder rather than to the intermediate member. That combination of features is recited in claim 1 which recites an intermediate member that is separate from the holder and a wedging deice which is attached to the holder. Claim 1 was rejected over a combination of the two above-discussed patents, i.e, Mitchell et al. and Basteck. However, in Mitchell et al. the intermediate member is not separate from the holder as presently claimed. In contrast, the intermediate member 60 of Mitchell et al. is integral with the holder 56. Basteck discloses a separate intermediate member 32, but requires

that the wedging device be attached to the intermediate member, rather than to the holder. Neither Mitchell et al. nor Basteck discloses the combination of an intermediate member that is separate from the holder and a wedging device that is attached to the holder, as recited in claim 1. Accordingly, it is submitted that claim 1 is allowable along with dependent claims 2-7 and 21-26.

Independent claim 27 defines an adjusting device which achieves advantages 1-3. Advantages 1 and 2 are achieved because claim 27 recites a sleeve that is actuated by an adjusting screw that is attached to the holder. Advantage 3 is obtained because claim 27 recites that slot portions are formed in each of the sleeve ends. In that regard, attention is directed to Fig. 8B wherein it can be visualized that when the left side of the sleeve is expanded to the left by an adjusting screw, that left side tends to rotate counter-clockwise about a fulcrum defined by the closed ends of the two left-hand slot portions 54. However, the portion of the sleeve possessing those slots is itself rotatable clockwise about a fulcrum defined by the closed ends of the two right-hand slot portions. Thus, the left side of the sleeve exhibits two degrees of flexing, enabling that left side to expand substantially linearly, to maintain constant surface contact with the insert, rather than pivoting. That feature is not disclosed by either Mitchell et al. or Basteck.

Independent claim 32 defines an adjusting device which achieves advantages 1 and 4. Advantage 1 is achieved because a sleeve is recited as engaging the insert, rather than the insert being engaged by the adjustment screw. Advantage 4 is achieved, because the second portion of the external surface (e.g., the surface 56 shown in Fig. 5A) bears against the wall of the cavity (e.g., the wall 46 shown in Fig. 5A). As a result, the sleeve is stabilized as it is expanded. Note that since claim 32 recites that the second portion of the internal surface of the sleeve (i.e., the portion 64 shown in Fig. 6) is cylindrically shaped, it will not be wedged outwardly by the wedge-shaped portion of the screw, so the screw will not tend to become bent as it is inserted into the sleeve, despite the fact that the sleeve engages the wall 46 of the cavity as the sleeve is being expanded. The structure recited in claim 32 is neither disclosed nor taught by the prior art of record.

The objections raised in paragraph no. 2 of the Official Action have been obviated. Reference number 24 has been deleted from the description of Fig. 1 as being unnecessary. The language at paragraph 54, lines 6-12 has been deleted to avoid the need to depict the alternative embodiment described thereby. Paragraph 60 has been amended to correct a minor error therein.

Claims 3, 4, and 6 have been amended to overcome any indefiniteness therein.

Paragraph 52 has been amended to recite that the expression "cutting member" could include not only the tool body, but also a cartridge, which is evident from page 14, lines 4-6 of the original specification.

In light of the foregoing, it is submitted that the application is in condition for allowance.

Respectfully submitted,

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Page 8, Paragraph 28

28. Figure 5a is a top cutaway view of the embodiment of Figure 1, [prior to] after adjustment of the position of the insert.

Page 8, Paragraph 29

29. Figure 5b is a top cutaway view of the embodiment of Figure 1, [after] prior to adjustment of the position of the insert.

Page 13, Paragraph 52

52. With reference now to FIGS. 1 and 2, wherein like numerals designate like components throughout all of the Figures, the insert adjusting device of the invention is adapted for use in a milling cutter 10 having a tool body 12. At least one cutting insert 14 with major surfaces 15, flanks 16, and cutting edges 17 and 18 is releasably secured in pocket 20 in tool body 12 by a retaining device [24]. Only a single insert is shown on the tool body in Figure 1, it being understood in the art that a plurality of such inserts may be uniformly disposed and releasably secured around the outer diameter 13 of the tool body 12 in a similar manner. In the embodiment of Figure 1, each retaining device [24] comprises a retaining wedge 22 and a pocket 20. Retaining wedge 22 comprises a top surface 30, an outer periphery 32 including an insert-contacting flank 34 and a bottom surface 36. The retaining wedge 22 has a centrally disposed hole 38 which extends from the top surface 30 through the bottom surface 36 for receiving retaining screw 42, which screw engages a threaded bore 40 (not shown) in the tool body 12. While the retaining device [24] disclosed in Figure I utilizes a pocket 20 in combination with a retaining wedge 22 secured to the tool body by a retaining screw 42, the invention is equally applicable to other retaining devices that utilize the combination of an insert receiving seat, for example a pocket, cartridge or the like, and various insert holding devices that secure the insert 14 to the tool body 12 and do not interfere with the functioning of the invention, for example clamps and screws. Thus, the insert 14 is secured to a

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cutting member which could comprise the tool body or a cartridge mounted in the tool body. The retaining device is designed, in a manner known in the art, to allow for minute changes of position, on the order of 0.0005 to 0.0075 inches as a result of forces exerted by the adjustment device.

Page 14, Paragraph 53

53. Pocket 20 includes a pocket floor 26 [and pocket sides 28] for receiving and supporting a cutting insert 14. [In this embodiment, the pocket side 28 across the insert from cutting edge 18 has been omitted rendering the] The pocket 20 is contiguous with a cavity 44 of substantially polygonal external shape in tool body 12. A hollow sleeve 50 of substantially polygonal external shape fits inside cavity 44. The sleeve 50 is in the form of tube having a hollow interior defining a hole 52 extending from one end 62 to the other end 62 of the sleeve [52], an external peripheral surface 60, end faces 62 and an internal peripheral surface 64.

Page 14, Paragraph 54

54. Figure 2 is a perspective view of the embodiment of Figure 1 showing the invention in its positional relation to retaining wedge 22 and insert 14. The sleeve 50 has a plurality of slots 54, extending substantially parallel to the longitudinal axis of the sleeve, which allow the sleeve to expand. Each slot intersects one of the end faces 62 of the sleeve. Expansion of the portion of the sleeve in engagement with the insert transmits force to the substantially incompressible insert, causing the insert to move outward along the pocket floor. In this manner, expansion or contraction of the sleeve adjusts the position of the insert 14 and hence the cutting edge 18 in relation to the tool body 12. It is desirable that the sleeve 50 engages, at least, between 50% to 100% of the insert flank 16, thereby providing for efficient transfer of force from the adjustment device to the insert. [In an alternative embodiment, the pocket side 28 adjacent cavity 44 is only partly omitted creating an aperture 48 in the pocket side 28, rendering pocket 20 only partially contiguous with

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cavity 44. In this alternative embodiment, sleeve 50 is preferred to have substantially the same dimensions as aperture 48 to permit non-binding expansion of the sleeve. This alternative embodiment is useful for applications wherein the sleeve may be smaller than the insert flank that is engaged by the sleeve.]

Page 15, Paragraph 55

55. Sleeve 50 is retained in the tool body 12 by an adjustment screw 70 extending through the [hollow interior] hole 52 of the sleeve 50 and threadingly engaging tool body 12. As shown in Figures 4a and 4b, sleeve 50 has a tapered portion 68. The sleeve may be expanded by either advancement or retraction of the adjustment screw, depending upon the angle of the tapered portion 68.

Page 16, Paragraph 57

57. Figure 4a and 4b show a sleeve 50 of the embodiment of Figure 1. A plurality of slots 54 are disposed on sleeve 50. The slots are disposed around the periphery of the sleeve in alternating fashion, i.e. slots intersecting one end face are positioned adjacent and offset from slots intersecting the opposite end face. The external peripheral surface 60 is generally polygonal and comprises an abutment flank 56 for contacting abutment surface 46 of the cavity and a flexing flank 58 for engaging the insert. The internal peripheral surface 64 is provided with a first region 66 having a tapered portion 68 extending at least a portion of the length of the sleeve toward one of the end faces 62. The first region 66 extends around flexing flank 58, preferably the portion of thereof engaging the insert 14.

Page 17, Paragraph 58

58. Figure [5a] 5b is a top cutaway view of the embodiment of Figure 1, showing insert 14 adjustably secured in tool body 12, prior to adjustment of the position of the insert 14. Sleeve 50 is positioned in the cavity 44 of tool body 12 by adjusting screw 70 such that abutment flank 56 contacts abutment surface 46 of the cavity 44 and

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flexing flank 58 engages insert 14. The ordinary expedient for accomplishing same is offsetting the threaded bore into which adjusting screw 70 is threadingly engaged, in a manner known in the art. The interface between the tool body, sleeve and insert is rendered rigid, and shift or "springing back" of the sleeve is minimized or stopped.

Page 17, Paragraph 60

60. Figure [5b] 5a shows the embodiment of Figure 5b [5a], after adjustment of the position of the insert by actuation of adjustment screw 70. The clearance space 49 is reduced in size due to expansion of sleeve 50, which expansion transmits force to substantially incompressible insert 14, thereby causing movement of the insert along pocket floor in a direction substantially perpendicular to the plane of the insert flank engaging flexing flank 58. In an alternative embodiment, shown in Figure 10, no clearance space is required as flexing surface 58 of sleeve 50 does not adjoin a clearance surface 47 of cavity 44.

Page 18, Paragraph 66

66. Figure 10 [11] is a top cutaway view of the another embodiment of the invention in the use environment of a rotary cutting tool utilizing inserts positioned in the tool body 12 in what is known in the industry as "laydown" cutting position. The retaining device of this embodiment comprises a [pocket and a] holddown screw 24, which passes through the center of insert major face 15 and into the tool body in a manner known in the art. Insert 14 is adjustably secured to the tool body by retaining device 24. Sleeve 50 is positioned in the cavity 44 of tool body 12 by adjusting screw 70 such that abutment flank 56 contacts abutment surface 46 of the cavity 44 and flexing flank 58 engages insert 14. No clearance space is required as flexing surface 58 of sleeve 50 does not adjoin a clearance surface 47 of cavity 44, but instead extends only along the insert.

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Marked Copy: Claims 1, 3, 4, 6, 20 [ As Amended ]

1. (Amended) A device for adjusting the position of a cutting insert adjustably secured in a pocket disposed in a [cutting tool body] holder, comprising:

a cavity in said [cutting tool body] holder, at least a portion of said cavity being contiguous with [the] said pocket;

an intermediate component separate from said holder and disposed within said cavity, [and] said intermediate component comprising an external peripheral surface and at least one expansion mechanism, said external peripheral surface engaging the insert at said contiguous portion; and

a wedging device movably attached to [the cutting tool body] said holder and engaging the intermediate component such that actuation of the wedging device results in expansion of the intermediate component in a direction substantially parallel to a desired direction of adjustment of the insert.

3. (Amended) The device of claim 1 wherein said [wedge] wedging device comprises a conical wedge.

4. (Amended) The device of claim 3 wherein said [wedge] wedging device includes an adjustment screw threadingly engaged to the [tool body] holder.

6. (Amended) The device of claim 1 wherein the intermediate component further comprises [a plurality of] opposite end faces facing generally parallel to a direction of movement of said wedging device, each end face being intersected by at least one [of said] expansion [elements] element.

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20. (Amended) A method for adjusting the position of an insert relative to a [cutting tool body] holder, wherein said tool body has a [retaining device including a] pocket having a floor and sides and a retaining device for adjustably securing the insert to said [tool body] holder, comprising the steps of:

positioning an insert in [a] said pocket in engagement with [an intermediate component comprising] a sleeve; the sleeve including an end, an external peripheral surface and at least one expansion mechanism; i.e., a hole extending through the end of the sleeve; the at least one expansion mechanism comprising generally aligned slot portions formed in the end and separated from one another by said hole; said external peripheral surface including a first portion engaging the insert [at said contiguous portion;], and a second portion engaging a wall of said cavity disposed opposite said pocket, said slot portions disposed between said first and second portions of said external surface; said hole having a tapered portion disposed adjacent said first portion of said external surface, and a cylindrical portion disposed adjacent said second portion of said eternal surface;

tightening the retaining device to adjustably secure the insert in the pocket; and

[actuating] inserting a wedging device into said hole, said wedging device [being in engagement with the expansion mechanism] exerting a wedging action against the tapered portion of the hole surface, thereby causing expansion of the [intermediate component] first portion of the external surface, resulting in change of position of the insert.